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EXAMINER	
TRAN, KHANH C	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/035,039	CLASSON ET AL.	
	Examiner	Art Unit	
	Khanh Tran	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 October 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12 and 14-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12 and 14-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 April 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. The Amendment filed on 10/26/2005 has been entered. Claims 12- and 14-38 are pending in this Office action.

Response to Arguments

2. Applicant's arguments filed on 10/26/2005 have been fully considered but they are not persuasive.

- On page 13 of the Amendment, Applicants argue that claims 1, 16, 20, 25, 28 and 40 are not obvious under 35 U.S.C 103(a) because the cited reference, Hämäläinen et al. US 6,289,217 B1, does not relate to the trustworthy channel quality data and the first transmission selection mode as recited in claims 1, 16, 20, 25, 28 and 40.

The Examiner responds that the arguments are not persuasive. As recited in the last Office action, in column 9 lines 10-45, the transmission of bursts is represented by modes 302, 303, 304 and 305. The receiving device tries, in modes 306, 307, 308, and 309, to decode the data sequence after each received burst and sends, along with the acknowledgement, a message of the success or failing of the decoding for the transmitting device. The transmitting device sends the next burst connected to the data sequence if the receiving device has not correctly decoded the data sequence. Hence, the receiving device determines if the burst is correctly decodable.

In column 10 lines 3-35, Hämäläinen et al. further teaches that in addition to the above described method, it is possible, in connection with non real-time data transmission, to use a method based on changing the modulation. The decision for changing the modulation order is most advantageously based on the fact that the measured C/I ratio or the value of the function Q, describing the connection quality, dependent thereon and describing the connection quality is compared with given threshold values.

Furthermore, in column 4 lines 30-45, the radio link adaptation takes place on the basis of the connection quality, which can be based on the Carrier to Interference ratio (C/I). According to Hämäläinen et al. teachings, the function Q, describing the connection quality, is a function of (C/I), i.e. Q = f(C/I). In column 10 lines 35-60, Hämäläinen et al. further teaches in connection with non-real-time data transmission as described in the example of transmission and reception of bursts above, *the radio link adaptation can be combined with a timer that studies how long an interval has passed from the last C/I ratio measurement and determines, on the basis of the elapsed time and advantageously also the known relative speed between the mobile station and the base station, whether the earlier calculated values are still valid*. If according to the timer the time elapsed from the last C/I ratio measurement surpasses a given limit value, in the next transmission there can be used, in order to make sure, certain "worst case" default values with respect to coding, modulation and interleaving, or there can be applied a similar method of agreement between the base station and mobile station as in connection with the bearer setup or handover. In view of the aforementioned disclosure, data transmission/reception used in conjunction with method based on changing the modulation and utilization of a timer to study how long an interval has passed from the last C/I ratio measurement and determines whether the earlier calculated values are still valid would relate to channel quality data that corresponds to the trustworthy channel quality data as claimed by Applicants. In light of the foregoing discussion, Hämäläinen et al. teachings do address "determining whether likely trustworthy channel quality data is obtainable" as claimed in claims 1, 16, 20, 25, 28 and 40.

- On pages 15-16, Applicants argue that the request for retransmission 310 described in Hämäläinen et al. is not the same as the first transmission selection mode as recited in claims 1, 16, 20, 25, 28 and 40 {Emphasis added}.

The Examiner responds that Applicants' arguments are moot because the last Office action does not equate the request for retransmission 310 to the first transmission selection mode. Referring back to column 9 lines 25-45, the receiving device *studies* in mode 309 as to which of the bursts that it transmitted was poorest in quality and requests the transmitting device to retransmit said burst according to mode 310. *In order to improve demodulation*, the original burst and its retransmitted copy are combined in mode 311 *by employing a known diversity-type method*. The known diversity-type method corresponds to the claimed first transmission selection mode.

Furthermore, as recited above, Hämäläinen et al. further suggests in addition to the non real-time method, it is possible to use method based on changing the modulation. For that reason, it would have been obvious for one of ordinary skill in the art at the time the invention was made that Hämäläinen et al. method can be modified to employ method based on changing the modulation in the transmission selection mode for retransmission to improve demodulation.

- On pages 16-17, Applicants argue that Hämäläinen et al. teachings relate to a single carrier system, with which it appears that the Examiner agrees, see Office Action of July 26, 2005, page 5, paragraph 3, trustworthiness of the channel quality data is less relevant to Hämäläinen et al..

The Examiner responds that as recited above, in column 4 lines 30-45, the radio link adaptation takes place on the basis of the connection quality, which can be based on the Carrier to Interference ratio (C/I). According to Hämäläinen et al. teachings, the function Q, describing the connection quality is a function of (C/I), i.e. Q = f(C/I) where Carrier and Interference are variables. In view of that, Hämäläinen et al. suggests application to a multicarrier system, which serves as a motivation for the claim rejection in view of Walton et al. US Patent Application Publication No. 2003/0086371 A1. As also recited above, in column 10 lines 35-60, Hämäläinen et al. further teaches in connection with non-real-time data transmission as described in the transmission of bursts, _the radio link adaptation can be combined with a timer that_ *studies how long an interval has passed from the last C/I ratio measurement and determines, on the basis of the elapsed time and advantageously also the known relative speed between the mobile station and the base station, whether the earlier calculated values are still valid*. In light of the foregoing discussion, Hämäläinen et al. teachings take into account the claimed trustworthiness of the channel quality data and suggestion of application to multicarrier system.

Conclusion: For all the reasons discussed above, the Examiner still maintains the rejection of claims 1, 16, 20, 25, 28 and 40 as being obvious under 35 U.S.C 103(a). Because dependency on independent claims 1, 16, 20, 25, 28 and 40, dependent claims 2-12, 14-15, 17-19, 21-24, 26-27, 29 and 31-34 are rejected for all the reasons as stated in the last Office action.

- On pages 18-19, Applicants argue that claim 35 is not obvious under 35 USC 103(a) over Walton et al. US Patent Application Publication No. US 2003/0086371A1 because Applicants argue that no motivation or suggestion can be drawn from the cited reference to modify Walton.

The Examiner responds that Walton et al. teaches four different types of metrics representing four different types of metrics signal-to-noise-plus interference ratio, frequency selectivity, time selectivity, performance represent four different types of channel state information (CSI). The foregoing metrics may be derived and used to select proper rate for a data transmission; see paragraphs [0027] – [0031] and [0033].

In paragraph [0132], Walton et al. teaches the channel and performance metrics may be sent to the transmitter (instead of the rate), which may then determine the rate for the data transmission based on the received metrics. In paragraph [0024], at the receiver, a rate selector, receiving the channel metrics, determines a suitable "rate" that may be used for all the transmission channels, e.g. frequency subchannels of an OFDM system. A *suitable rate is the average rate used for all frequency subchannels* of an OFDM system as appreciated by one of ordinary skill in the art. In paragraph [0011], because coherence time, used to quantify time selectivity, is a metric related to different characteristics of the communication channel and because the receiver (mobile unit) can transmit back the control information in the form of selected rate or the metrics themselves to the transmitter, it would have been obvious for one of ordinary skill in the art at the time of the invention that the feedback control information can be modified to send back the channel coherence time status. As recited above, the transmitter can determines a suitable "rate" that may be used for all the transmission channels, e.g. frequency subchannels of an OFDM system, therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made that Walton et al. teachings can be modified to include in the feedback control information the average channel quality indicator (e.g. channel metrics) across the multi-carrier as claimed to determine a suitable "rate" that may be used for all frequency subchannels of an OFDM system. The channel coherence time indicates how quickly the multi-carrier changes.

Using similar arguments as discussed above, and furthermore in paragraph [0024], the suitable "rate" can be used for a subset of the transmission channels available for use for data transmission (e.g. a subset of the frequency subchannels of an OFDM system), therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made that Walton et al. teachings can be modified to include in the feedback control information the channel quality indicator (e.g. channel metrics) for a subset of the sub-carriers that comprise the multi-carrier channel as claimed to determine a suitable "rate" that may be used for a subset of the frequency subchannels of an OFDM system for use for data transmission.

Conclusion: For all the reasons discussed above, the Examiner still maintains the rejection of independent claim 35 as being obvious under 35 U.S.C 103(a). Because dependency on independent claim 35, dependent claims 36-38 are rejected for all the reasons as stated in the last Office action.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-12, 14-21, 25-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamalainen et al. U.S. Patent 6,289,217 B1 in view of Walton et al. U.S. Patent Application Publication No. US2003/0086371 A1.

Regarding claims 1, 14 and 28, Hamalainen invention is directed to a radio connection adapted to an environment changing over the connection in a cellular radio system where the radio traffic between the base station and the mobile stations is arranged on a multiple access principle. Figure 3 illustrates a retransmission as part of a method according to Hamalainen invention.

Referring to figure 3, in column 9 lines 10-45, for transmission, the source data is according to mode 301 subjected to channel coding and interleaving so that a given data sequence is interleaved for the duration of a relatively short period (usually 2-8 bursts, 4 bursts shown in figure 3). The foregoing step corresponds to the claimed step of providing data to be transmitted.

The transmission of bursts is represented by modes 302, 303, 304 and 305. The receiving device tries, in modes 306, 307, 308, and 309, to decode the data sequence after each received burst and sends, along with the acknowledgement, a message of the success or failing of the decoding for the transmitting device. The transmitting device sends the next burst connected to the data sequence if the receiving device has not correctly decoded the data sequence. Hence, the receiving device determines if the burst is correctly decodable. In column 10 lines 3-35, Hämäläinen et al. further teaches that in addition to the above described method, it is possible, in connection with non real-time data transmission, to use a method based on changing the modulation. The decision for changing the modulation order is most advantageously based on the fact that the measured C/I ratio or the value of the function Q dependent thereon and describing the connection quality is compared with given threshold values.

Furthermore, in column 4 lines 30-45, the radio link adaptation takes place on the basis of the connection quality, which can be based on the Carrier to Interference ratio (C/I). According to Hämäläinen et al. teachings, the function Q, describing the connection quality is a function of (C/I), i.e. Q = f(C/I). In column 10 lines 35-60, Hämäläinen et al. further teaches in connection with non-real-time data transmission as described in the transmission of bursts, *the radio link adaptation can be combined with a timer that studies how long an interval has passed from the last C/I ratio measurement and determines, on the basis of the elapsed time and advantageously also the known relative speed between the mobile station and the base station, whether the earlier calculated values are still valid*. If according to the timer the time elapsed from the last C/I ratio measurement surpasses a given limit value, in the next transmission there can be used, in order to make sure, certain "worst case" default values with respect to coding, modulation and interleaving, or there can be applied a similar method of agreement between the base station and mobile station as in connection with the bearer setup or handover. In view of the aforementioned disclosure, data transmission/reception used in conjunction with method based on changing the modulation and utilization of a timer to study how long an interval has passed from the last C/I ratio measurement and determines whether the earlier calculated values are still valid would relate to channel quality data that corresponds to the trustworthy channel quality data as claimed by Applicants. In light of the foregoing discussion, the act of studying *how long an interval has passed from the last C/I ratio measurement and determines, on the basis of the elapsed time and advantageously also the known* *relative speed between the mobile station and the base station, whether the earlier calculated values are still* valid as taught by Hämäläinen et al. address the claimed step of "determining whether likely trustworthy channel quality data is obtainable.

Referring back to column 9 lines 25-45, the receiving device *studies* in mode 309 as to which of the bursts that it transmitted was poorest in quality and requests the transmitting device to retransmit said burst according to mode 310. *In order to improve demodulation*, the original burst and its retransmitted copy are combined in mode 311 *by employing a known diversity-type method*. The known diversity-type method corresponds to the claimed first transmission selection mode. Furthermore, as recited above, Hämäläinen et al. further suggests in addition to the non real-time method, it is possible to use method based on changing the modulation. For that reason, it would have been obvious for one of ordinary skill in the art at the time the invention was made that Hämäläinen et al. method can be modified to employ method based on changing the modulation in the transmission selection mode for retransmission to improve demodulation. In view of the foregoing discussion, the foregoing step corresponds to the claimed step of "when likely trustworthy channel quality data is not obtainable, determine whether to transmit at least a portion of the data pursuant to a first transmission selection mode".

Referring to figure 1, when all bursts belonging to one interleaving period are received, as disclosed in figure 3, the receiver determines whether the value of the function Q describing the connection quality is higher than the threshold value Q_th, see column 5 lines 13-23. If the connection quality is higher than the threshold value, the size of data transmission capacity reserved for the radio connection in the frame structure is reduced, so that the transmitting device must decrease the coding rate, change the coding type or increase the modulation order in order to make all data being transmitted to fit in the reserved capacity, see column 3 line 62 via column 4 line 16. As result of that, if the connection quality is higher than the threshold value, likely trustworthy channel quality data is obtainable as appreciated by a person of average skill in the art. Hamalainen et al. does not expressly teach the claimed step of when likely trustworthy channel quality data is obtainable, at least attempting to obtain channel quality data. However, in real time mode, it would have been obvious for one of ordinary skill in the art at the time the invention was made that the receiving device keep receiving channel quality data because the transmitting device continue transmit data (no pause) until a request for reducing the capacity reserved for the connection between the base station and the mobile station. The foregoing step corresponds to the claimed "at least attempting to obtain channel quality data when likely trustworthy channel quality data is obtainable"

As recited above, if the connection quality is higher than the threshold value, the size of data transmission capacity reserved for the radio connection in the frame structure is reduced, so that the transmitting device must decrease the coding rate, change the coding type or increase the modulation order in order to make all data being transmitted to fit in the reserved capacity. In light of the foregoing, using the channel quality data, the transmitting device selects a second transmission mode (e.g. by decreasing the coding rate, changing the coding type or increasing the modulation order) for transmitting data. Hence, the foregoing step corresponds to the claimed step "whether channel quality data is obtained, using the channel quality data to determine how to transmit at least a portion of the data pursuant to a second transmission mode".

Hamalainen et al. does not teach "wherein using the channel quality data to determine whether, how, and when to transmit at least a portion of the data pursuant to a second transmission selective mode includes selecting at least one particular carrier from amongst a plurality of candidate carriers" as claimed in the application claim.

Walton et al. invention is directed to techniques to adaptively control the rate of a data transmission in wireless (e.g. OFDM) communication system. Various types of metrics relate to different characteristic of the communication channel; see paragraphs [0010] and [0011]. In paragraph [0089], various types of metrics may be used in different manners to adaptively control the rate of a data transmission. In paragraph [0100], depending on the channel response, *all or only a subset of the available frequency subchannels may be selected for use*. The foregoing underlined disclosure corresponds to the claimed "selecting at least one particular carrier from amongst a plurality of candidate carriers". Hamalainen et al. and Walton et al. teachings are in the same field of endeavor. Hamalainen et al. radio link adaptation takes place on the basis of the connection quality, wherein the connection quality can be based on carrier to interference ratio (C/I ratio). Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention that Hamalainen et al. radio link adaptation can be modified to implement Walton et al. teachings of depending on the channel response, all or only a subset of the available frequency subchannels may be selected for use. Motivation is that according to Hamalainen et al. teachings, the C/I ratio determines the connection quality, and hence, if the connection quality degrades, select other carriers would improve the connection quality.

Regarding claim 2, as recited in claim 1, the radio link adaptation can be combined with a timer that studies how long an interval has passed from the last C/I ratio measurement and determines, on the basis of the elapsed time and advantageously also the known relative speed between the mobile station and the base station, whether the earlier calculated values are still valid. In view of that, the act of "*studying how long an interval has passed from the last C/I ratio measurement and determines, on the basis of the elapsed time and advantageously also the known relative speed between the mobile station and the base station, whether the earlier calculated values are still valid*" would determine whether the channel quality data is likely accurate at a time when used as claimed in the instant application.

Regarding claim 3, because Q, describing the connection quality, is based on the C/I ratio as discussed in claim 1. The Q value would determine whether the channel quality data is likely accurate at a time when used for each of subcarriers as claimed in the instant application.

Regarding claim 4, according to Walton et al. teachings, in paragraphs [0068] and [0069], metrics Related to Time Selectivity (TS Metrics) [0069] Time selectivity of a communication channel may be quantified by coherence time in the time domain or a corresponding Doppler spread in the frequency domain. In paragraph [0078], to estimate the coherence time of the communication channel in a frequency division duplex system, the transmitter can send a pilot (e.g., a pilot symbol comprised of a constant amplitude tone in each frequency sub-channel).

Regarding claim 5, in paragraph [00699], Walton teaches that Time selectivity of a communication channel may be quantified by coherence time in the time domain or a corresponding Doppler spread in the frequency domain. Coherence time is a measure of the duration over which the channel can be expected not to change appreciably. In the frequency domain, this may be measured by a Doppler spectrum associated with the channel, with the width of the Doppler spectrum being inversely proportional to the channel's coherence time.

Regarding claim 6, Hamalainen et al. and Walton et al. teachings apply to fading channel, which is a memory channel requiring accessing previously acquired data.

Regarding claim 7, Hamalainen et al. and Walton et al. teachings are adaptive. Therefore, it requires acquisition of new data to update the channel estimate.

Regarding claims 8 and 11-12, as recited in claim 5, Walton teaches that Time selectivity of a communication channel may be quantified by coherence time in the time domain or a corresponding Doppler spread in the frequency domain. Coherence time is a measure of the duration over which the channel can be expected not to change appreciably.

Regarding claim 9, as recited in claim 4, in paragraph [0078], to estimate the coherence time of the communication channel in a frequency division duplex system, the transmitter can send a pilot (e.g., a pilot symbol comprised of a constant amplitude tone in each frequency sub-channel).

Regarding claim 10, in paragraph [0060], to estimate the coherence bandwidth of the communication channel in an FDD system, the transmitter can send a pilot. In an OFDM system, a pilot symbol comprised of a constant amplitude tone in each of the available frequency subchannels may be sent.

Regarding claim 15, as recited above, if the connection quality is higher than the threshold value, the size of data transmission capacity reserved for the radio connection in the frame structure is reduced, so that the transmitting device must decrease the coding rate, change the coding type or increase the modulation order in order to make all data being transmitted to fit in the reserved capacity. In light of the foregoing, using the channel quality data, the transmitting device selects a second transmission mode (e.g. by decreasing the coding rate, changing the coding type or increasing the modulation order) for transmitting data. Because the size of data transmission capacity reserved for the radio connection in the frame structure is reduced, the transmitting device does not transmit a portion of the data.

Regarding claim 16, claim 16 is rejected on the same ground as for claim 1. Furthermore, if the connection quality is higher than the threshold value, the size of data transmission capacity reserved for the radio connection in the frame structure is reduced, so that the transmitting device must decrease the coding rate, change the coding type or increase the modulation order in order to make all data being transmitted to fit in the reserved capacity. In light of the foregoing, it would have been obvious for one of ordinary skill in the art that decreasing the coding rate, changing the coding type corresponds to selection of a coding scheme from among a plurality of candidate coding scheme. Hamalainen et al. further teaches utilization one of higher order modulation schemes such as BPSK, QPSK, which corresponds to the claimed selection of a modulation scheme.

Regarding claim 17, as recited in claim 1, Walton et al. invention is directed to techniques to adaptively control the rate of a data transmission in wireless (e.g. OFDM) communication system. Various types of metrics relate to different characteristic of the communication channel; see paragraphs [0010] and [0011]. In paragraph [0089], various types of metrics may be used in different manners to adaptively control the rate of a data transmission. In paragraph [0100], depending on the channel response, *all or only a subset of the available frequency subchannels may be selected for use*.

Regarding claim 18, claim 18 is rejected on the same ground as for claim 16 because of similar scope. The only difference between claim 16 and claim 18 is that the selection of a particular modulation and coding scheme is for the first transmission selection mode in claim 18.

Regarding claim 19, in paragraph [0104], Walton et al. teaches that the interleaving provides time diversity for the coded bits, permits the data to be transmitted based on an average SNR for the frequency subchannels used for the data transmission, combats fading, and further removes correlation between coded bits used to form each modulation symbol.

Regarding claim 20, claim 20 is rejected on the same ground as for claim 1 because of similar scope. Furthermore, according to Hamalainen et al. teachings, if the connection quality is higher than the threshold value, the size of data transmission capacity reserved for the radio connection in the frame structure is reduced, so that the transmitting device must decrease the coding rate, change the coding type or increase the modulation order in order to make all data being transmitted to fit in the reserved capacity. In light of the foregoing teachings, it would have been obvious for one of ordinary skill in the art at the time of the invention that Hamalainen et al. teachings can be modified to have different modulation and different coding scheme when the frame structure is reduced. Motivation is the size of data transmission capacity reserved for the radio connection in the frame structure is reduced.

Regarding claim 21, referring to figure 3 of Hamalainen et al. invention, for each burst transmitted from the transmitting device, the receiving device response with a positive including channel quality data. The receiving device corresponds to the transmission target.

Regarding claim 25, claim 25 is rejected on the same ground as for claim 1 because of similar scope. Furthermore, in column 3, lines 44-55, according to Hamalainen et al. invention in one embodiment, the radio link adaptation taking place after the bearer setup is carried out in a somewhat different procedure depending on whether we are talking about a real-time (RT) or non-real-time (NRT) data transmission. Real-time data transmission is often called delay-critical data transmission, and for *an RT bearer there is typically reserved in the frame structure a given slot or slots that are repeated from frame to frame in equal size*.

Regarding claims 26-27, as recited in claim 1, if the connection quality is higher than the threshold value, the size of data transmission capacity reserved for the radio connection in the frame structure is reduced, so that the transmitting device must decrease the coding rate, change the coding type or increase the modulation order in order to make all data being transmitted to fit in the reserved capacity. Hence, the step of the transmitting device decreasing the coding rate, changing the coding type would correspond to the claimed step of whether the transmitter use. In light of the foregoing, using the channel quality data, the transmitting device selects a second transmission mode (e.g. by decreasing the coding rate, changing the coding type or increasing the modulation order) for transmitting data as receiving a request for reducing the capacity.

Regarding claim 29, claim 29 is rejected on the same ground as for claim 1 and further in view of claim 20 because of similar scope.

Regarding claim 30, claim 30 is rejected on the same ground as for claim 1 because of similar scope. Furthermore, referring to column 3, lines 5-15 of Hamalainen et al. invention, multiple function mobile stations can simultaneously maintain several bearers that combine the mobile station to one or several base stations.

Regarding claim 31, referring to Walton et al. invention, in paragraph [0035], the SNR may be determined at the receiver for each group of transmission channels (e.g., frequency subchannels) to be individually processed (e.g., coded and modulated).

Regarding claim 32, referring to Walton et al. invention, in paragraph [0035], the SNR can be determined at the receiver for each group of transmission channels, e.g. frequency sub-channels, to be individually processed. Hence, the fore going teachings address the claimed limitation "*at least attempting to obtain the corresponding channel quality data for each of a plurality of candidate carriers*".

Regarding claim 33, referring to Walton et al. invention, in paragraphs [0035] [0036], a rate selector 166 receives the channel metrics from channel estimator 162 and performance metrics from demodulator/decoder 164 and, based on the received metrics, determines a suitable "rate" that *may be used for all or a subset of the transmission channels* available for use for data transmissions, e.g. the frequency sub-channels of an OFDM system.

Regarding claim 34, as recited in claim 33, a rate selector 166 receives the channel metrics from channel estimator 162 and performance metrics from demodulator/decoder 164 and, based on the received metrics, determines a suitable "rate" that *may be used for all or a subset of the transmission channels* available for use for data transmissions, e.g. the frequency sub-channels of an OFDM system.

4. Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamalainen et al. U.S. Patent 6,289,217 B1 and Walton et al. U.S. Patent Application Publication No. US2003/0086371 A1 as applied to claim 21 above, and further in view of McFarland U.S. Patent Application Publication US2002/0006167 A1.

Regarding claim 22, Hamalainen and Walton et al. do not teach wherein transmitting a signal to the transmission target includes transmitting a fast sounding channel evaluation signal such that the transmission target can evaluate a time-frequency response of the multi-carrier domain as claimed in the application claim.

McFarland invention is directed to provide a multi-carrier system in which the number of carriers, the symbol rate, and thereby the overall occupied bandwidth can be varied; see paragraph [0015]. In paragraphs [0049] [0050], the best operating mode could be based on a trial "sounding" of the communications channel. The transmitter would send out a special signal (e.g., a reference signal having constant and known phase/magnitude characteristics that can be easily observed) or packet of information. The receiver would analyze this signal to determine the quality of the channel. Factors would include the multi-path delay as well as the total available bandwidth. These observations would be sent back to the original transmitter, presumably using a very robust mode of transmission, or at least a mode of transmission that is receivable for the channel in question. At this point, both nodes will be aware of the channel conditions. Hamalainen, Walton et al. and McFarland are in the same field of endeavor. Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention that Hamalainen and Walton et al. teachings can be modified to include McFarland teachings. Motivation is that Hamalainen teachings measure the connection quality and Walton et al. teachings determine various types of metrics.

Regarding claims 23-24, as recited in claim 22, the receiver would analyze this signal to determine the quality of the channel. Factors would include the multi-path delay as well as the total available bandwidth. These observations would be sent back to the original transmitter, presumably using a very robust mode of transmission.

5. Claims 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton et al. U.S. Patent Application Publication No. US2003/0086371 A1.

Regarding claim 35, in paragraph [0089], Walton et al. teaches various types of metrics can be used in different manners to adaptively control the rate of a data transmission. In paragraph [0090],

Walton et al. does not expressly teach the claimed limitations "when the channel coherence time indicates that the multi-carrier channel is changing too quickly, ...".

Walton et al. teaches four different types of metrics representing four different types of metrics signal-to-noise-plus interference ratio, frequency selectivity, time selectivity, performance represent four different types of channel state information (CSI). The foregoing metrics may be derived and used to select proper rate for a data transmission; see paragraphs [0027] – [0031] and [0033]. In paragraph [0132], Walton et al. teaches the channel and performance metrics may be sent to the transmitter (instead of the rate), which may then determine the rate for the data transmission based on the received metrics. In paragraph [0024], at the receiver, a rate selector, receiving the channel metrics, determines a suitable "rate" that may be used for all the transmission channels, e.g. frequency subchannels of an OFDM system. A suitable rate is the average rate used for all frequency subchannels of an OFDM system as appreciated by one of ordinary skill in the art. In paragraph [0011], because coherence time may be used to quantify time selectivity is a metric related to different characteristics of the communication channel and because the receiver (mobile unit) can transmit back the control information in the form of selected rate or the metrics themselves to the transmitter, it would have been obvious for one of ordinary skill in the art at the time of the invention that the feedback control information can be modified to send back the channel coherence time status. As recited above, the transmitter can determines a suitable "rate" that may be used for all the transmission channels, e.g. frequency subchannels of an OFDM system, therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made that Walton et al. teachings can be modified to include in the feedback control information the average channel quality indicator (e.g. channel metrics) across the multi-carrier as claimed to determine a suitable "rate" that may be used for all frequency subchannels of an OFDM system.

Walton et al. does not expressly teach the claimed limitations "when the channel coherence time does not indicate that the multi-carrier channel is changing too quickly, ...".

Using similar arguments as discussed above, and furthermore in paragraph [0024], the suitable "rate" can be used for a subset of the transmission channels available for use for data transmission (e.g. a subset of the frequency subchannels of an OFDM system), therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made that Walton et al. teachings can be modified to include in the feedback control information the channel quality indicator (e.g. channel metrics) for a subset of the sub-carriers that comprise the multi-carrier channel as claimed to determine a suitable “rate” that may be used for a subset of the frequency subchannels of an OFDM system for use for data transmission.

The channel coherence time indicates or does not indicate that the multi-carrier channel is changing too quickly.

Regarding claim 36, Walton et al. does not teach measuring the speed of movement of the mobile communications system as claimed. However, because the rate of change of channel is also directly related to the speed of movement of the mobile communications system, it would have been obvious for one of ordinary skill in the art at the time of the invention that Walton et al. channel metrics can be modified to include measuring the speed of movement of the mobile communications system.

Regarding claim 37, in paragraph [0069], coherence time is represented by a Doppler Spectrum associated with the channel, with the width of the Doppler Spectrum being inversely proportional to the channel’s coherence time.

Regarding claim 38, as discussed in paragraph [0069], coherence time is also measured by a Doppler spectrum associated with the channel. Doppler spread is a measure of the dispersion in the frequency domain caused by *time variability* of the channel. In view of the foregoing disclosure, measuring of the dispersion in the frequency domain caused by *time variability* of the channel corresponds to the claimed "comparing channel frequency response as determined at differing times".

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 571-272-3007. The examiner can normally be reached on Monday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KCT

Khanhcong Tran 01/06/2006

Examiner KHANH TRAN